contact with said melted boron oxide substance so as to responsively achieve said target amount of said carbon to be doped into said semiconductor crystal.

63. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 53, wherein said carbon comprises powder carbon.

64. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 56, wherein said carbon comprises powder carbon.

65. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 53, wherein said carbon comprises fiber carbon.

66. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 56, wherein said carbon comprises fiber carbon.

REMARKS

Applicants submit new claims 40 - 66 to more fully claim their invention. The new claims are set forth above in reissue format, with underlining. A copy of the new claims is attached hereto without underlining, for greater legibility during examination.

Independent claim 40 is directed to a method for making a crystalline, carbon doped semiconductor as more fully detailed in the claim itself. This claim, and all of the other new claims (which depend from claim 40) recognize that the melting point of B_2O_3 is inherently much lower than the disclosed, exemplary semiconductor compound, GaAs. Therefore in the disclosed method, the B_2O_3 inherently melts before that semiconductor compound, creating a mixture of carbon in B_2O_3 before the doping of carbon from that mixture into the semiconductor compound.

Claims 40-52 are drawn to a method of preparing crystalline material. Claims 53 – 66 further specify preparation of a single crystal. Dependent claims 41-52 and 54-66 add generally the same limitations as included in existing dependent claims 2-22.

Applicants request declaration of an interference between the present application and U.S. Patent No. 6,045,767 (Liu), which has a U.S. priority date of November 21, 1997. The present application is for reissue of U.S. Patent No. 6,007,622, which has an earlier U.S. filing date of April 25, 1997 and an even earlier Japanese priority date of April 26, 1996.

Claims 23 - 30 of the present application are based on claims 1 - 8 of the Liu patent. These claims were included in the present reissue application at the time of filing, April 3, 2001, within one year of the issuance of the Liu patent on April 4, 2000. Applicants thereby complied with the requirements of 35 U.S.C. § 135(b)(1).

Applicants tentatively propose the following interference count corresponding to claim 26 of the present application and claim 4 of the Liu patent:

> A method for vertical boat growth of single crystal, semi-insulating GaAs ingots having controlled planned target levels of carbon therein comprising: (a) loading a crucible with a charge of poly-crystal GaAs material; a source of carbon; and boron oxide over a selectively oriented seed crystal; (b) placing said crucible in a closed quartz tube; (c) applying a controlled pattern of heating to melt the charge and a portion of the seed crystal to sequentially freeze the melt starting at the interface with the seed crystal to form a single crystal; wherein said source of carbon is carbon powder in a selected quantity having a defined large nominal doping potential compared to the planned target level of carbon in an as grown ingot; and said boron oxide is provided in an amount for providing spacer material between an as grown ingot and a crucible wall, and between a seed crystal and the bottom of said crucible.

Applicants thank the Examiner for the telephone call on Wednesday, November 14, 2001. At that time, the Examiner requested and Applicants' undersigned attorney provided identification of the interfering patent, the Liu patent. In response to an inquiry from the Examiner, Applicant's attorney explained that claims 23 – 30, directed to a charge, vertical boat growth (method) and products of method claims, were based on those of the Liu patent. The Examiner indicated that he had not found any new matter or prior art reason for rejecting the

pending claims. Applicant's attorney also stated that Applicants intended to file new method claims and the Examiner indicated they would be considered if submitted by Friday, November 16, 2001. Those claims are presented in this Preliminary Amendment.

Applicants request that all claims be examined.

Please apply all charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: November 16, 2001

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New Claims without Reissue-style underlining

In the specification:

Add the following Claims:

40. A method of preparing a carbon-doped group III-V compound semiconductor comprising the steps of:

melting a boron oxide substance in contact with carbon, thereby forming a boron oxide - carbon mixture,

heating and melting a III-V compound semiconductor raw material together with said boron oxide - carbon mixture,

maintaining said compound raw material in melted form for a period to permit carbon to migrate from said boron oxide - carbon mixture into said compound raw material, and

solidifying said melted compound raw material to form a crystalline carbon-doped compound semiconductor,

wherein the amount of carbon in the initial boron oxide - carbon mixture is larger than the amount of carbon doped into said compound semiconductor.

41. The method of preparing a carbon-doped group III-V compound semiconductor according to claim 40, wherein said boron oxide substance comprises boron oxide and water.

42. The method of preparing a carbon-doped group III-V compound semiconductor according to claim 41, wherein said boron oxide substance contains 10-500 wt ppm of said water.

43. The method of preparing a carbon-doped group III-V compound semiconductor according to claim 40, wherein said amount of said carbon in contact with said melted boron oxide substance is at least 10 times larger than said amount of carbon doped into said crystalline semiconductor.

44. The method of preparing a carbon-doped group III-V compound semiconductor according to claim 40, further comprising a step of subjecting solid carbon to a heat treatment under reduced pressure before melting said boron oxide substance in contact with said carbon.

45. The method of preparing a carbon-doped group III-V compound semiconductor according to claim 44, comprising carrying out said heat treatment for 1 hour to 12 hours at a temperature of 500° C. – 2000° C. under a pressure of 1 Torr – 1×10^{-8} Torr.

46. The method of preparing a carbon-doped group III-V compound semiconductor according to claim 45, further comprising a step of maintaining said melted compound raw material in a melted state for a certain time period before said step of solidifying said melted raw material.

47. The method of preparing a carbon-doped group III-V compound semiconductor according to claim 46, wherein said step of maintaining said melted compound raw material in a melted state is carried out for 3 - 72 hours.

48. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 40, further comprising selecting a target amount of said carbon to be doped into said compound semiconductor crystal, and adjusting said amount of said carbon in contact with said melted boron oxide substance so as to responsively achieve said target amount of said carbon to be doped into said semiconductor crystal.

49. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 40, wherein said carbon comprises powder carbon.

50. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 42, wherein said carbon comprises powder carbon.

51. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 40, wherein said carbon comprises fiber carbon.

52. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 42, wherein said carbon comprises fiber carbon.

53. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 40, wherein said compound raw material comprises GaAs, and wherein said compound semiconductor crystal comprises a single crystal of GaAs.

54. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 53, carried out such that said carbon-doped compound semiconductor crystal has a variation of carbon concentration of not more than 8-1/3% between a lowest carbon concentration and a highest carbon concentration, relative to said lowest carbon concentration.

55. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 53, wherein said boron oxide substance comprises boron oxide and water.

56. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 55, wherein said boron oxide substance contains 10-500 wt ppm of said water.

57. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 53, wherein said amount of said carbon in contact with said melted boron oxide substance is at least 10 times larger than said amount of carbon doped into said compound semiconductor crystal.

58. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 53, further comprising a step of subjecting solid carbon to a heat

treatment under reduced pressure before melting said boron oxide substance in contact with said carbon.

59. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 58, comprising carrying out said heat treatment for 1 hour to 12 hours at a temperature of 500° C. – 2000° C. under a pressure of 1 Torr – 1×10^{-8} Torr.

60. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 53, further comprising a step of maintaining said melted compound raw material in a melted state for a certain time period before said step of solidifying said melted raw material to grow said crystal.

61. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 60, wherein said step of maintaining said melted compound raw material in a melted state is carried out for 3-72 hours.

62. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 53, further comprising selecting a target amount of said carbon to be doped into said compound semiconductor crystal, and adjusting said amount of said carbon in contact with said melted boron oxide substance so as to responsively achieve said target amount of said carbon to be doped into said semiconductor crystal.

63. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 53, wherein said carbon comprises powder carbon.

64. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 56, wherein said carbon comprises powder carbon.

65. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 53, wherein said carbon comprises fiber carbon.

66. The method of preparing a carbon-doped group III-V compound semiconductor crystal according to claim 56, wherein said carbon comprises fiber carbon.